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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,031	04/23/2002	Alain Coulombe	9555.12SUSWO	4533
23552	7590	03/15/2005		
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			EXAMINER LEE, HWA S	
			ART UNIT 2877	PAPER NUMBER

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/031,031

Applicant(s)

COULOMBE ET AL.

Examiner

Andrew Hwa S. Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 9-17 is/are rejected.
- 7) ☒ Claim(s) 5-8 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |  |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)            |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/26/02</u> . | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Claim Objections*

1. Claims 1, 3, 5-11, 14 and 15 are objected to because of the following informalities:  
Steps (a)-(h) are recited but claim 1 does not show such step numbering. It will be assumed that steps (a), (b), (c) etc. are referring to steps (j), (k), (l) etc. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4 and 13 are rejected under 35 U.S.C. 102(b) as being anticipated by EP 01 82469.

EP 01 82469 shows a method and apparatus for obtaining surface profilometry and three dimensional surface contours comprising:

- (j) projecting a grid on a reference object (reference plane); the grid being located at a first position relative to the camera and to the reference object;
- (k) taking, with the camera (linear array camera, 1420), an image of the reference object illuminated by said projected grid; said image of the reference object having intensity values for each pixel;

- (l) repeating steps (j) and (k) at least two times (three frames each of reference plane; translation of grating, page 25 first paragraph; Figure 8A) with the grid being located at two different known positions relative to the camera and to the reference object to yield at least three intensity values for each pixel;
- (m) computing the reference object phase for each pixel using the at least three reference object intensity values for the corresponding pixel (Figure 8A);
- (n) projecting the grid on the object; the grid being located at said first position';
- (o) taking with the camera an image of the object (implicit) by said projected grid; said image of the object having intensity values for each pixel position (implicit);
- (p) repeating steps (n) and (o) at least two times with the grid being located at said two different positions to yield at least three intensity values for each pixel (Figure 8A);
- (q) computing the object phase for each pixel position using the at least three object intensity values for the corresponding pixel (Figure 8A);
- (r) computing the difference of height between the object and the reference object for each pixel using said reference object phase and said object phase for the corresponding pixel (Figures 4B and 8B; pages 25-26): and
- (claim 2) using said difference of heights between the object and the reference object for each pixel to determine the relief of the object. (e.g. Figure 10 shows an object's relief).

With regards to claims 3 and 4, please see page 25.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 9-12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 01 82469 as applied in claim 1 and further in view of WO 98 55826.

EP 01 82469 shows all the steps as applied in claim 1, but does not show the comparison of images with 180 degree phase difference.

WO 98 55826 shows measuring surface flatness using shadow Moiré technology and phase stepping image processing wherein, the Moiré fringe patterns are computed using the light intensity equations (page 6, lines 12-14) with different phase values, two of which have 180

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degrees, i.e.  $\pi$  radian, difference. The relative position of the object/reference object is sequentially chosen as to create four phase-shifted Moiré fringe patterns (page 6, lines 3-11). The thus obtained intensity images are then subtracted (page 7). The result is then used for further data processing steps, e.g. filtering smoothing, as described in WO 98 55826 to provide preliminary analysis of the object/reference object. Therefore, one of ordinary skill in the art would have used the subtracting of the two phase shifted images in order to obtain a clearer image.

With regards to claim 14, WO 98 55826 shows the embodiment on page 20 describes an interferometry method to determine the variation of the object's surface with temperature over time. For that purpose, the measurements are repeated to determine the change in surface flatness, i.e. variations of heights, of the object (page 20, lines 6-14). At the time of the invention, one of ordinary skill in the art would have monitored changes due to temperature changes over time and thus would meet the limitations of claim 14.

4. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 01 82469.

EP 01 82469 shows a method and apparatus for obtaining surface profilometry and three dimensional surface contours comprising:

a grid projecting assembly (grating projector, 1410), including a grid (G; Figure 7), an illuminating assembly including a light source (e.g. laser, 111; Figure 2) to be projected through the grid onto the object, a projector to project the grid onto the object;

an image acquisition apparatus including a camera provided with an array of pixels  
(linear array camera, 1420):

a computer (processor, 150; digital computer associated with memory and peripherals;  
page 12, first paragraph) configured for:

- receiving images of the projected grid on a reference object from the image acquisition apparatus;
- computing the reference object phase for each pixel using the at least three reference object intensity values for the corresponding pixel (Figure 4A; page 16, second paragraph;
- computing the object phase for each pixel using the at least three object intensity values for the corresponding pixel (Figure 4A); and
- computing the difference of height between the object and the reference object for each pixel using said reference object phase and said object phase for the corresponding pixel (Figure 4B).

EP 01 82469 does not expressly show the grid is mounted on a support and that the computer is configured for positioning the grid relative to the object and the image acquisition system, however '469 shows that the object is mounted on a rotary stage (1490., Figure 13A), the movement of the rotary stage being controlled by a processor (1470, Figure 14) which allows to change the position of the object's surface relative to the grid and the acquisition system. Therefore one of ordinary skill in the art would have changed the relative position of the grid to the object in order to optimal alignment and thus meeting the limitations of the claim.


*Allowable Subject Matter*

Claim 5-8 and 15 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Hwa S. Lee whose telephone number is 571-272-2419. The examiner can normally be reached on Tue-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley Jr. can be reached on 571-272-2800 ext 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Andrew Hwa Lee  
Primary Examiner  
Art Unit 2877